Limiting complexity and enabling autonomy in public administrations

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Overview

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2) Theoretical:	The nature of administrations Administrations as graphs Complexity and reliability Structural changes A model for autonomy
3) Conclusion:	Good and bad NPM

The classical bureaucracy

Characterization of a bureaucracy (Weber, 1985):

- Clear-cut attribution of competences
- Fixed hierarchies with explicite rights and duties
- “Principle of protocol”
- Strict separation of job and private life
- Property involved in administrative procedures belongs to the state
- Learning of skills within the system
- Deterministic careers
- Rule-based procedures

The challenge of complexity

In administrative sciences, politology and sociology, many different „soft indicators“ of a more complex environment of administrations have been mentioned:

- More national and international laws
- More demands of the political system towards the administration (e.g. information of politicians)
- More social agents (e.g. NGOs)
- A fragmentation of society
- The need to implement new technologies within administrations (e-government).

New Public Management

Defining aspects of NPM (Schedler et al, 2003):

- Cultural transition (“customer-satisfaction”).
- Goal-orientation (global budgeting)
- Organizational transitions (flat hierarchies, abolishment of the civil servant status)
- Competition (contracts, incentive wages)
- Impact-orientation (evaluation, auditing)

→ NPM should induce self-organization within public administrations.

Problems with NPM

Switzerland has ~10 years experience with NPM-driven reforms of the public administration. The following aspects have been considered as problematic:

- „L‘éclatement de l‘état“ (Knoepfel, 2003): More and more different types of organizational units emerge
- Substantial increase of PR activities of public administration (60 information services for 50 organizational units, more than 80 Mio. CHF)
- More salary for principals, more work for subordinates
- Loss of control of the sovereign, „local agreements“ between autonomous units of the administration and „actor-communities“

The important question

How can a public administration integrate more tasks in the most efficient way?

The nature of administrations

Govern:	Goal-oriented regulation of problematic aspects of social relations and their underlying conflicts by means of social institutions and state authority (defining norms).
Administrate:	The process of application of norms and the process of supervision and avenge offences.
Planning?	Conflict with the sovereign
Services?	Privatization-debate.

Administrations are control-structures. “Stability of information” (e.g. taxation data, interpretation of laws) is crucial for the functioning of a public administration.

Administrations as graphs

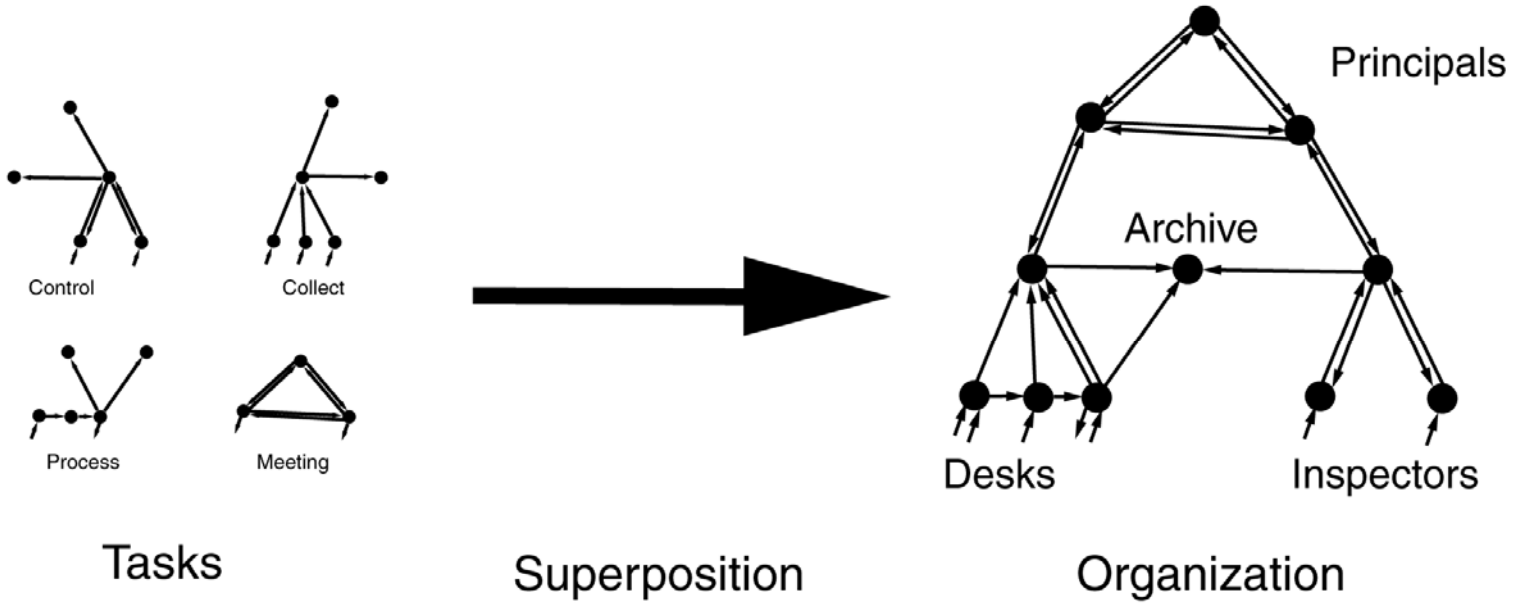

Figure 1: The superposition of four tasks results in the organizational structure of a simplified administration, where four "units" can be distinguished: desks, inspectors, archive and principals.

Connectivity matrix: The sum of the elements of the i-th row indicates the number of outputs of the i-th node, the sum of the elements of the i-th column indicates the number of inputs of the i-th node. The numbering of the nodes is arbitrary.

												o_j
	0	1	1	0	0	0	0	0	0	0	0	2
	1	0	1	1	0	0	0	0	0	0	0	3
	1	1	0	0	0	1	0	0	0	0	0	3
	0	1	0	0	1	0	0	0	0	0	0	2
	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	1	0	1	0	0	0	0	1	1	0	4
	0	0	0	1	0	0	0	1	0	0	0	0	2
	0	0	0	1	0	0	0	0	1	0	0	0	2
	0	0	0	2	1	0	0	0	0	0	0	1	4
	0	0	0	0	0	1	0	0	0	0	0	0	1
	0	0	0	0	0	1	0	0	0	0	0	0	1
	0	0	0	0	0	2	1	1	1	1	1	0	6
i_j	2	3	3	5	3	3	2	2	2	2	2	1	

Complexity and reliability (1)

The *structural complexity* C_S of the administration is defined as

$$C_S = \frac{t}{n-1}\left(\sum_{j=1}^{n}\left(i_j - \frac{\bar{e}}{2}\right)^2 + \sum_{j=1}^{n}\left(o_j - \frac{\bar{e}}{2}\right)^2\right)$$

where t indicates the total number of tasks, i_j indicates the number of input edges and o_j the number of output edges originating from node j and $\bar{e}$ indicates the mean number of edges originating from a node. Thus, the structural has a generic aspect (variety of connectivity) and a non-generic aspect (number of tasks implemented).

The *reliability* R_S of the system is defined as

$$R_S = \frac{1}{n}\sum_{j=1}^{n} p_j^{i_j + t_j}$$

where p_j is the reliability of node j and t_j is the number of tasks the node is involved. We consider only input edges, as one can suppose, that each node getting a input, respectively a certain information, has to do something with this input (processing it, archiving it, etc.) and that there is a nonzero probability that this act is performed incorrect.

Complexity and reliability (2)

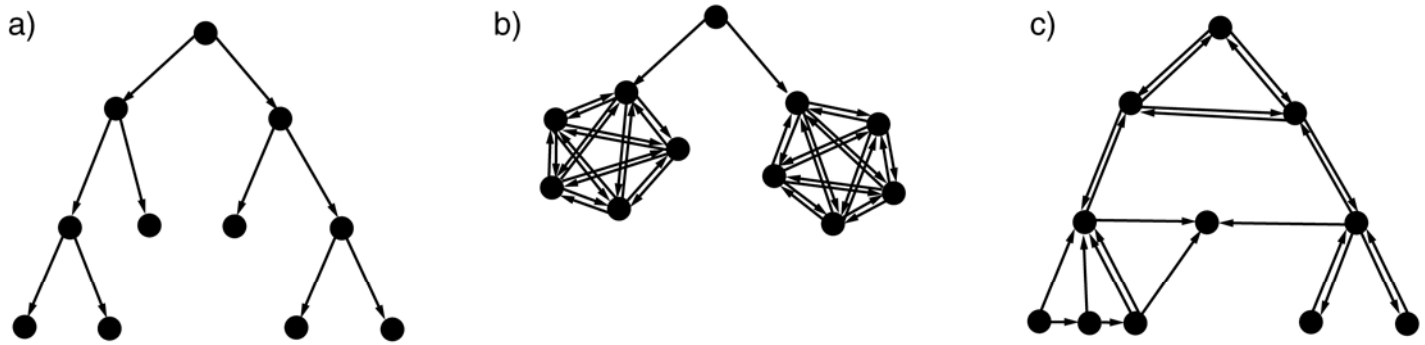

Figure 2: Three examples of graphs representing simplified administrations of 11 nodes each: a) tree-structure with $C_S = 4,7$, b) two working-groups with all-to-all connections and $C_S = 8,5$, c) example of figure 1 with $C_S = 13,5$. We assumed 4 tasks for each administration.

Complexity and reliability (3)

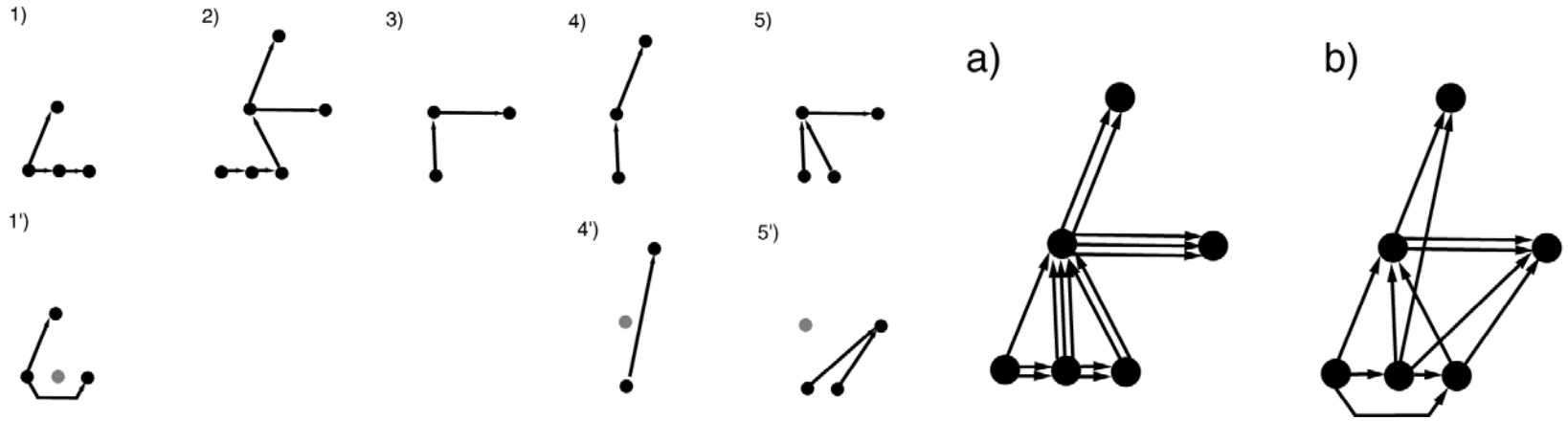

Figure 3: Administrations where information of different tasks (5 in this case) have to pass critical nodes have higher structural complexity ($C_{S(a)} = 45$, $C_{S(b)} = 24$) and lower reliability ($R_{S(a)} = 0.749$, $R_{S(b)} = 0.783$)

Structural changes

- „Human-factor“ based self-organization (Parkinson, 1957)
- Generic self-organization
- Induced self-organization (NPM)

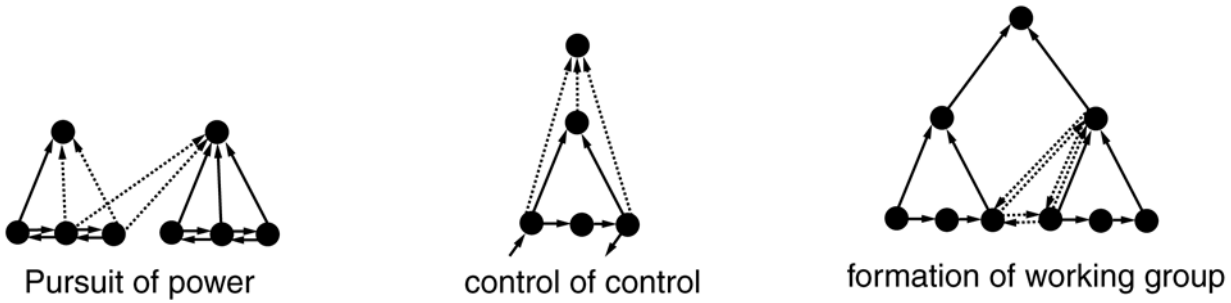

Figure 4: Three classes of self-organization within a public administration: a) shows an example of “pursuit of power”, where two of three members of one group are integrated in another group, C_S increases from 4,29 to 6,57 (the number of tasks is unchanged). b) shows an example of “control of control”, an additional task is implemented (the control) and C_S increases from 1.2 to 4.4. c) shows an example of induced self-organization, where an additional task is implemented by forming a working group, C_S changes from 1.94 to 5.42 (dashed lines indicate changed or added edges).

A model for autonomy

Autonomous systems develop according to their own dynamics under the interaction with their environment, e.g. 1D chaotic system with load.

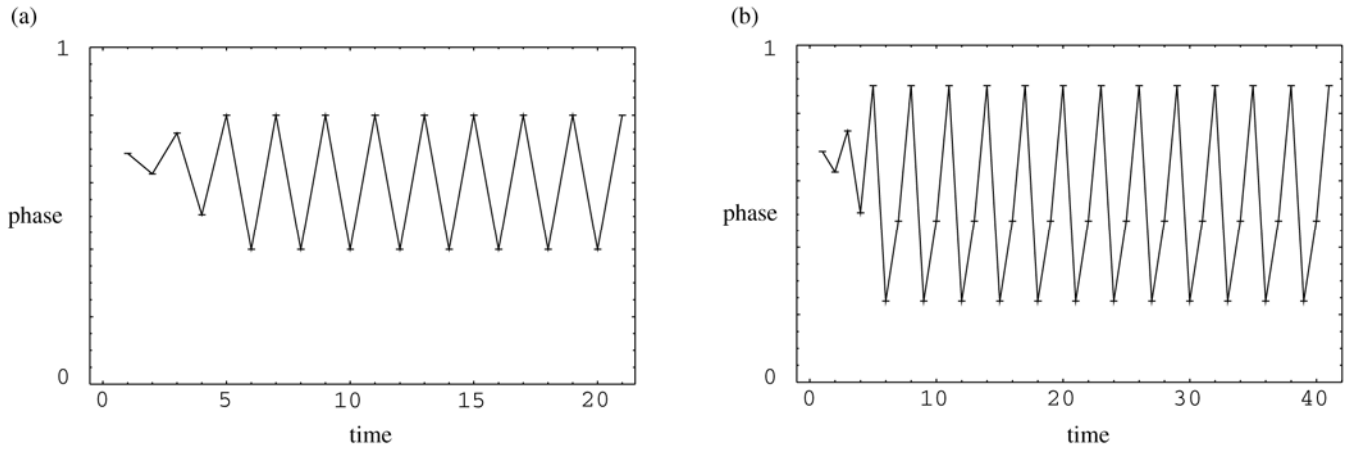

Figure 5: Autonomous gait selector. By reducing the load, the gait changes from a period 2 (a) to a period 3 (b). The system consists of a chaotic tent map, where the load is implemented by a horizontal line replacing the graph above a certain hight (the limiter)

Good and bad NPM

„The more autonomous units of the administration become, the more important is controlling“ (Schedler et al. 2003).

Self-organization should only be allowed within a structural framework with fixed input and output points of administrative tasks. It should only affect the workflow within this framework.

Good elements of NPM:	Global budgeting („load“) Flat hierarchies
Bad elements of NPM:	Inducing market dynamics abolishment of civil servant status